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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/570,669	03/06/2006	Akihiko Endo	P29121	1242
7055 7590 10/27/2008 GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191				
EXAMINER SARKAR, ASOK K				
ART UNIT 2891		PAPER NUMBER		
NOTIFICATION DATE 10/27/2008		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com  
pto@gbpatent.com

### Office Action Summary

**Application No.**

10/570,669

**Applicant(s)**

ENDO ET AL.

**Examiner**

Asok K. Sarkar

**Art Unit**

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 July 2008.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 9-21 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-4 and 9-21 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 06 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1 – 4 and 9 – 21 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 3, 4, 10, 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi, US 5,753,353 in view of Toshiro, JP 05 – 226620.

Regarding these claims, Kikuchi teaches a manufacturing method for an SOI wafer comprising the steps of:

- bonding a wafer for active layer 1a has a thickness of less than 0.10  $\mu\text{m}$  (column 6, line 30) with a supporting wafer 3 via an insulating film 2 interposed therebetween to thereby form a bonded wafer (Fig. 3C);
- and then reducing a film thickness in a part of said active layer wafer of said bonded wafer to thereby form an SOI layer for manufacturing said SOI wafer, wherein said supporting wafer that has been bonded contains boron by an amount of  $9 \times 10^{18}$  atoms/ $\text{cm}^3$  or more (column 5, line 5).

Kikuchi fails to teach forming a rear surface oxide insulating film having a thickness of 0.1  $\mu\text{m}$  to 0.5  $\mu\text{m}$  on a surface opposite to the bonding surface of the supporting wafer prior to said bonding.

Toshiro teaches a a manufacturing method for an SOI wafer comprising the steps of forming a rear surface oxide insulating film 12 having a thickness of 0.1  $\mu\text{m}$  to 0.5  $\mu\text{m}$  on a surface opposite to the bonding surface of the supporting wafer prior to said bonding with references to Drawings. 1 and 2 in paragraphs 13 – 18 for the benefit of reducing the warpage of the SOI substrate and at the same time prevent mixtures of impurities coming into the SOI layer from the support substrate in paragraphs 5 – 7.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kikuchi and form a rear surface oxide insulating film having a thickness of 0.1  $\mu\text{m}$  to 0.5  $\mu\text{m}$  on a surface opposite to the bonding surface of the supporting wafer prior to the bonding for the benefit of reducing the warpage of the SOI substrate and at the same time prevent mixtures of impurities coming into the SOI layer from the support substrate as taught by Toshiro in paragraphs 5 – 7.

6. Claims 2 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi, US 5,753,353 in view of Toshiro, JP 05 – 226620 as applied to claims 1 and 10 above, and in view of Sakaguchi, US 6,613,678.

Kikuchi in view of Toshiro fails to teach the steps of: ion – implanting of hydrogen gas or a noble gas element to said active layer wafer to thereby form an ion – implanted layer in said active layer wafer; subsequently bonding said active layer wafer and said supporting wafer together to thereby form a bonded wafer; and then heat treating said bonded wafer to thereby induce cleavage in said bonded wafer at the site of said ion – implanted layer as an interface.

Sakaguchi teaches a method of forming SOI wafers comprising the steps of ion – implanting of hydrogen gas or a noble gas element to said active layer wafer to thereby form an ion – implanted layer in said active layer wafer; subsequently bonding said active layer wafer and said supporting wafer together to thereby form a bonded wafer; and then heat treating said bonded wafer to thereby induce cleavage in said bonded wafer at the site of said ion – implanted layer as an interface with reference to Figs. 2 – 6 in between column 6, line 5 and column 7 line 25 for the benefit of establishing a

manufacturing process for SOI substrate that is free of oxidation induced stacking faults in column 3, lines 3 – 8.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kikuchi in view of Toshiro and implement the steps of ion – implanting of hydrogen gas or a noble gas element to said active layer wafer to thereby form an ion – implanted layer in said active layer wafer; subsequently bonding said active layer wafer and said supporting wafer together to thereby form a bonded wafer; and then heat treating said bonded wafer to thereby induce cleavage in said bonded wafer at the site of said ion – implanted layer as an interface for the benefit of establishing a manufacturing process for SOI substrate that is free of oxidation induced stacking faults as taught by Sakaguchi in column 3, lines 3 – 8.

7. Claims 9 and 11 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi, US 5,753,353 in view of Toshiro, JP 05 – 226620 as applied to claims 1 and 10 above, and in view of Samata, US 6,008,110.

Regarding these claims, Kikuchi in view of Toshiro fails to teach the supporting wafer is subjected to annealing at 1100°C or higher in a reducing gas atmosphere containing hydrogen gas before said step of bonding.

Samata teaches a method of manufacturing SOI wafers in which the supporting wafer is subjected to annealing at 1100°C or higher in a reducing gas atmosphere containing hydrogen gas before said step of bonding (column 7, lines 30 – 41) for the benefit of reducing oxidation induced stacking faults on the substrates and removal of Fe by gettering in column 7, lines 20 – 29.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kikuchi in view of Toshiro and subject the supporting wafer to annealing at 1100°C or higher in a reducing gas atmosphere containing hydrogen gas before said step of bonding for the benefit of reducing oxidation induced stacking faults on the substrates and removal of Fe by gettering as taught by Samata in column 7, lines 20 – 29.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (9 AM- 6 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue A. Purvis can be reached on 571 272 1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Asok K. Sarkar/  
Primary Examiner, Art Unit 2891  
October 17, 2008